



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Agency for Toxic Substances  
and Disease Registry  
Atlanta GA 30333

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SUPERFUND BRANCH

Mr. Robert Morby  
Chief  
Superfund Branch  
Waste Management Division  
EPA Region VII  
726 Minnesota Avenue  
Kansas City, Kansas 66101

Dear Mr. Morby:

Enclosed are three copies of the completed Health Assessment on the following site prepared by the Office of Health Assessment, ATSDR:

Missouri Electric Works (MEW)

We have received and taken into account your comments on the draft document previously sent to your Regional Office. We very much appreciate your comments and look forward to working with you and your staff in the future.

Sincerely yours,

*Chester L. Tate Jr.*  
Chester L. Tate Jr., P.E.  
Division of Health Assessment  
and Consultation

Enclosure

MEW Site File  
Break3\_009404



S00153888  
SUPERFUND RECORDS

File 1167

Sno:	11EW
ID#	110218096596
Break	3
Other:	AR ADDENDUM

# Health Assessment for

MISSOURI ELECTRIC WORKS (MEW) PROPOSED NATIONAL PRIORITIES LIST SITE

CAPE GIRARDEAU, MISSOURI

CERCLIS NO. MOD980965982

NOV 9 1989

Agency for Toxic Substances and Disease Registry  
U.S. Public Health Service

MEW Site File  
Break3\_009405

## THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, ATSDR has conducted this preliminary health assessment on the data in the site summary form. Additional health assessments may be conducted for this site as more information becomes available to ATSDR.

## SUMMARY

The Missouri Electric Works (MEW) site has been proposed for listing on the National Priorities List (NPL) by the U.S. Environmental Protection Agency (EPA). The facility sells, services, and remanufactures electric motors, transformers, and transformer controls. It has been in its present location since 1953. Past disposal practices have resulted in polychlorinated biphenyl (PCB) contamination of soil and sediment.

Based on the available information, this site is considered to be of potential public health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Human Exposure Pathways Section below, human exposure to PCBs may be occurring and may have occurred in the past via ingestion of and dermal contact with on-site soils and sediments. Recommendations are presented to restrict public access and contact with on-site soils and sediments.

## BACKGROUND

### A. SITE DESCRIPTION AND HISTORY

The Missouri Electric Works (MEW) occupies approximately 6.4 acres in a light industrial/commercial area. It has been in its present location since 1953. The site consists of one building and outside storage areas. The MEW facility sells, services, and remanufactures electric motors, transformers, and transformer controls. In addition, it recycles transformer oil and copper wire. The transformer oil was filtered and reused, with about 90 percent being salvaged. The remaining waste oil was either sold to local residents for dust-control purposes, disposed of by a removal contractor, or simply allowed to leak or spill onto the ground around the facility. Some waste oil was reportedly burned on site. The total amount of waste oil generated has been estimated to be 28,000 gallons. In 1984, approximately 5,000 gallons of waste oil were removed from the site.

The site is on a higher elevation than most of the residences or commercial establishments nearby. Adjacent and to the north is a carpet distributor. To the south, adjacent to and on approximately the same level, is a single-family residence. Further south several private residences border Highway 61. These residences are roughly the same elevation as the MEW facility with lower ground and Highway 61 separating them from MEW. To the west, separated from the facility by Highway 61 and a drainage ditch, are light industries. Most of the site property is east of the MEW building, bordered by a ravine and a warehouse parking lot.

## B. SITE VISIT

ATSDR representatives visited the site on March 21, 1989. The site is not fenced, and access is unlimited. The topography is relatively flat, but the boundaries slope on the north, west, and east to adjacent property. A drainage ditch in front (west) of the property contains standing water at points downstream. This drainage channel empties into the Cape La Croix Creek about 2 miles downstream. The ravine at the back (east) of the property eventually empties into a drainage ditch that runs along Wilson Road. This ditch contains standing water at its lower elevations. The ravine was dry at the time of the site visit. A fenced area within the site boundary contains a garden. This area may have been used for vegetable gardening (corn, onions) within the last year. Reportedly, there is an orchard on site. One small sign, containing a contaminated soil warning, was seen in the back of the property, facing inward toward the facility. Several transformers and other electrical equipment are stored outside the building. In the back of the property, there are piles of old tires. There were no indications that public contact with the site is a common occurrence.

## C. COMMUNITY HEALTH CONCERNS

No community health concerns have been reported.

## DEMOGRAPHICS, LAND AND RESOURCE USE

The number of employees in the surrounding industries and residences is unknown. MEW employs 10 people. Within a 4-mile radius of the site are an estimated 37,250 people, based on the 1980 census.

As stated above, the land surrounding the site is used primarily for industrial and commercial purposes. In the lower elevation areas to the east and south, there may be some cropland. No surface water bodies on, or close to, the site are suitable for or provide consistent human contact. The Mississippi River, located approximately 2 miles from the site, is used for fishing, boating (recreational and commercial), and swimming. The Cape La Croix Creek receives runoff from the site through a series of drainage ditches. The Creek eventually flows into the Mississippi River approximately 2 miles to the west.

Three groundwater-bearing units are near the site. These are the overburden on-site, the Platin limestone, and the alluvium to the south of the site. The depth to groundwater is estimated to be 35 feet. According to geological studies referenced in the Hazard Ranking System Package, these three water-bearing units are connected hydraulically. MEW uses the Platin limestone bedrock groundwater via an on-site well for the plant's industrial and drinking water needs. A public water supply well, used during peak demand periods, is screened in the alluvial aquifer. It is 3.2 miles south of the site. Most of the water needs of the City of Cape Girardeau are provided for by the Mississippi River. Groundwater from the public well is blended with river water during peak demand periods.

## ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

### A. ON-SITE CONTAMINATION

The environmental contamination on-site consists of polychlorinated biphenyls (PCBs). The following Table 1 details the environmental media found to be contaminated and the range of concentrations found. All values are for Aroclor-1260, a common PCB isomer found in transformer fluids.

TABLE 1  
ON-SITE POLYCHLORINATED BIPHENYLS  
MISSOURI ELECTRIC WORKS

<u>ENVIRONMENTAL MEDIA</u>	<u>NUMBER OF SAMPLES</u>	<u>CONCENTRATION RANGE</u>
Surface soil	91	1 - 28,000 ppm
Subsurface soil (1-2')	12	ND - 27 ppm
(3-4')	12	ND - 43 ppm
(5-6')	1	ND
Groundwater (domestic well)	2	ND
(monitoring well)	4	ND - 0.004 ppm

In addition to PCB sampling, three sediment samples from drainage channels from the areas reported to have been used for burning were collected and analyzed for dioxins. The results, expressed in 2,3,7,8-tetrachlorodibenzodioxin equivalents, showed less than 1 ppb.

### B. OFF-SITE CONTAMINATION

Off-site sediments in the drainage from the site, air samples in the downwind direction from the site, and surface wipe samples on buildings adjacent to the site have been collected. These data are presented in Table 2.

TABLE 2  
OFF-SITE POLYCHLORINATED BIPHENYLS  
MISSOURI ELECTRIC WORKS

<u>ENVIRONMENTAL MEDIA</u>	<u>NUMBER OF SAMPLES</u>	<u>CONCENTRATION RANGE</u>
Sediment	56	0.4 - 540 ppm
Air	6	ND - 0.04 ug/m <sup>3</sup> *
Surface deposition	8	0.9 - 2.2 ug/100 cm <sup>2</sup>

\*approximately 3 parts per trillion (ppt) based on Aroclor-1260

### C. QUALITY ASSURANCE AND QUALITY CONTROL

Samples were collected and analyzed according to EPA contract laboratory program guidelines. The data appear to be of good quality and satisfactory for the purpose of judging public health implications of the contaminants noted. However, we could not determine if the monitoring well and domestic well water samples were filtered before analysis. Filtering water samples before analysis may result in an underestimate of exposure; water from domestic wells usually is not filtered.

Some data provided for review (Table 6 of reference 2) were not used in this assessment. Sample locations could not be determined from the information provided.

### D. PHYSICAL AND OTHER HAZARDS

The outside storage areas on site which contain electrical equipment to be serviced could pose physical hazards. Since the site is not fenced, public access can be gained.

## PATHWAYS ANALYSES

### A. ENVIRONMENTAL PATHWAYS (FATE AND TRANSPORT)

PCBs are man-made compounds that are persistent in the environment and that resist biodegradation, with the degree of persistence related to the percent chlorination. The most common trade name is Aroclor. Aroclor-1260, the PCB measured at this site, is very stable in the environment. Aroclor-1260 is 60 percent chlorinated.

PCBs are strongly adsorbed to sediments or other organic matter in water, with the degree of sorbency directly related to the percent chlorination. Experimental and monitoring data have shown that PCB concentrations are higher in sediment and suspended matter than in the associated water column. However, resolution into the water column from contaminated sediments has been shown to occur, and is suspected to be a major factor, along with volatilization from ground surfaces, in the cycling of PCBs in the environment. Solubility in water ranges from 0.0027 (Aroclor-1260) to 0.42 mg/L, with solubility increasing with lower percent chlorination. Henry's Law constants (estimates the potential for a chemical to be released from a water matrix) for PCBs range from  $5.2\text{E-}4$  to  $2\text{E-}3$  atmosphere-meter<sup>3</sup>/mole (25 degrees C), with Aroclor-1260 equal to  $4.6\text{E-}3$ .

Leaching from soil by water is expected to be slight under most conditions. However, in the presence of organic solvents, significant leaching can occur. Ordinarily, however, movement of PCBs through the soil will occur indirectly by migration of soil particles to which PCBs have adsorbed.

PCBs in air exist predominantly in the vapor phase. With a vapor pressure of  $4.05 \times 10^{-5}$  mm Hg at 25 degrees C, saturation vapor concentrations of Aroclor-1260 should approach 0.05 ppm. Saturation situations will never occur under normal environmental conditions (typical ambient concentrations of PCBs range from  $10^{-9}$  to  $10^{-6}$  ppm). Most PCB vapor will tend to sorb onto aerosols.

The degree of chlorination also influences the metabolism and distribution of PCBs in animals. Fish are particularly important in the bioaccumulation process as it pertains to humans, since game fish consume benthic organisms or other bottom-feeding fish and humans are prone to consume those fish higher up the food chain. Plants are not known to either metabolize or concentrate PCBs. Vegetables grown in contaminated soil may be contaminated if not thoroughly washed.

Therefore, the environmental pathways of concern at this site are contaminated soil, sediment, and airborne particulate and bioaccumulation in the aquatic food chain.

#### B. HUMAN EXPOSURE PATHWAYS

Based on the environmental pathways identified above, the following human exposure pathways are of potential concern at this site: ingestion of contaminated soil and sediment; dermal contact with contaminated soil and sediment; ingestion of garden produce grown in contaminated soil and not thoroughly washed; ingestion of contaminated aquatic organisms; and inhalation of airborne particulates.

PCB absorption can occur from ingestion, dermal, and inhalation exposure. However, the ingestion route is judged to be the most significant. Quantitative evaluations of the relative contribution by each route are generally not available.

#### PUBLIC HEALTH IMPLICATIONS

Occasional skin irritations, usually acne-like lesions and rashes called chloracne, and liver effects are the only significant adverse health effects that have been observed in PCB-exposed workers. Workers are exposed to PCBs at levels that are much higher than those received by the general public. Adverse health effects have not been observed in people in the United States with nonoccupational exposure. Effects of PCBs in experimentally exposed animals include liver damage, skin irritations, death, low birth weights and other reproductive effects, and cancer. However, these experimental exposures generally occur at higher levels than those found in the human environment. The liver and cutaneous tissues are the primary target organs due to high lipid (fat) content; PCBs are lipid soluble.



Various human subpopulations are considered to be at higher risk: those persons who have occupational exposure, nursing infants if their mothers have fish as a large portion of their diet, embryos, fetuses, and neonates because of incompletely developed liver microsomal enzyme systems, persons with liver infections, and persons with certain abnormal liver syndromes. There are no studies in the literature of PCB toxicity, conducted at concentrations comparable to those found in the contaminated media identified at this site, from which to derive potential or expected health effects. Of course, consideration of cancer as the endpoint of public health concern usually means that no exposure is to be tolerated. PCB-caused liver cancer has been demonstrated in laboratory animals; the available epidemiological data do not indicate a consistent tumorigenic effect among people exposed to PCBs.

PCB contamination has been documented in on-site soils, groundwater, and sediments; and in off-site sediments. The main route of transport of PCBs through the environment to human receptor populations is by ingestion of contaminated soil particles, and, for those whose diets contain unusually large amounts of aquatic organisms, ingestion of contaminated aquatic organisms, normally fish.

PCBs normally do not partition into the aqueous phase but remain adsorbed on sediments. Therefore, groundwater and surface water are not expected to be important pathways. Although only on-site groundwater has been evaluated, only slight contamination of groundwater has been found, considering the substantial surface soil contamination documented. Groundwater from the Platten formation was not found to be contaminated. PCB contamination in treated water supplies is rare; only those persons consuming untreated (filtered) groundwater would be expected to have any exposure by this route. The MEW well on-site has been sampled on two occasions and found to be uncontaminated. The water source for the adjacent residence is thought to be municipal but this has not been confirmed.

Excessive PCB exposure by inhalation has not been reported except in occupational situations. Air samples collected to gauge the site-related contamination showed a maximum concentration of 3 parts per trillion (ppt). Values of PCBs (converted to Aroclor 1260) measured in urban environments have ranged up to 2 ppt. We do not consider 3 ppt to be of public health concern. The increase in air concentrations as a result of on-site surface activities such as soil removal, construction, and so forth, and cannot be commented upon in the absence of data. The fact that off-site migration has occurred via the airborne pathway is supported by the surface sampling data. There are no public health-related criteria with which to evaluate surface contamination. Routine human contact with the surfaces evaluated is not likely.

MEW Site File  
Break3\_009412

Sediments found in channels draining the site contain PCBs. It is not clear from the information available how far downstream in the channels sampling was conducted before a cutoff concentration of 5 ppm PCB was encountered. However, considering the geographic and demographic characteristics of the surrounding area, we think that the frequency of occasional public contact with contaminated sediments is probably small, and that the frequency of chronic contact is probably nonexistent. This infrequent contact by persons conducting business in the industries adjacent to this site is not expected to result in any adverse health effects.

The opportunity for sediments to migrate to Cape La Croix Creek and ultimately to the Mississippi River probably depends largely on the amount of rainfall and the amount of human activity that displaces the sediments in the drainage channels. We have no information about the propensity for flooding in this area and the opportunity for sediments to be spread beyond their present boundaries. We would not expect any site-related aquatic food chain contamination to exist. The Cape La Croix Creek is essentially unusable for any type of fishing.

Access to the site by persons other than MEW workers is unrestricted. Children may live in the residence adjacent to the site, although this has not been determined. Children are more likely than adults to ingest or otherwise come in contact with contaminated soils. The other residences farther from the site are sufficiently removed such that significant contact by these persons would be a remote possibility.

PCB exposure from ingestion of contaminated soil remaining on produce taken from the on-site garden may be of public health concern. We do not know if this garden is still in use. Judging from the size of the garden, it probably is used for private use only, and widespread public exposure would be unlikely. Crops whose produce comes in contact with the ground and is not peeled or washed thoroughly is of greatest concern. The U.S. Food and Drug Administration (FDA) recommends that food contain no more than 3 ppm PCBs.

In summary, contaminated surface soil on site represents the pathway of most concern at this site, primarily because of the potential for ingestion and dermal contact, and secondarily because edible produce may be grown in the soil. On-site sediments also provide a potential public health concern via dermal contact and ingestion. Groundwater and surface water per se are not expected to be contaminated sufficiently to be of concern. Sediments probably have not migrated off-site to a distance where significant contact by the public would occur. Airborne exposure, under the conditions measured, is not of public health concern. Surface deposition cannot be evaluated in terms of public health impact; one would expect surface deposition to increase over time but be diluted by rainwater or other washoff phenomena.

MEW Site File  
Break3\_009413

## CONCLUSIONS

Based upon information reviewed, ATSDR has concluded that this site is of potential public health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Human Exposure Pathways Section above, human exposure to PCBs may be occurring and may have occurred in the past via contact with contaminated soil.

Off-site sediments are contaminated, but the geographic location of the contamination relative to potentially exposed populations limits the exposure to only infrequent and limited occurrences.

Contaminated sediments could eventually reach the Mississippi River, where bioaccumulation by edible aquatic species could occur. In our judgement, this is a remote possibility.

Although off-site migration via the air route has occurred, air PCB levels are unremarkable. Currently, surface deposition concentrations cannot be evaluated for public health impact.

Consumption of produce grown in on-site soils may be of public health concern.

Further environmental characterization and sampling of the site and impacted off-site areas during the Remedial Investigation and Feasibility Study (RI/FS) should be designed to address the environmental and human exposure pathways discussed above. When additional information and data become available, e.g., the completed RI/FS, such material will form the basis for further assessment by ATSDR at a later date.

## RECOMMENDATIONS

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, the Missouri Electric Works site has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indication that human exposure to on-site/off-site contaminants may be currently occurring and may have occurred in the past, this site is not being considered for follow-up health studies at this time because no human exposure to contaminants of public health concern exists at this time. However, if data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR will reevaluate this site for any indicated follow-up.

The following recommendations are presented:

1. Restrict access to the site in order to prevent contact with contaminated surface soil and sediment.
2. Control surface migration of contaminated sediments to limit additional PCB burden in off-site drainageways.
3. Advise against consuming produce grown in on-site soils. Better still, eliminate gardening activities in on-site soils.
4. Ascertain the domestic water source for the adjacent residence.
5. Determine if any children live in the adjacent residence.

#### PREPARERS OF THE REPORT

Environmental Health Reviewer:	Clifford L. Moseley, CIH, CHWS Certified Industrial Hygienist Environmental Engineering Branch
Regional Representative:	David Parker Public Health Advisor ATSDR Region VII Regional Services
Typist:	Charlotta V. Gavin Clerk Typist Environmental Engineering Branch

#### REFERENCES

The following documents were provided to ATSDR for review. These documents form the basis of this Preliminary Health Assessment. Further information made available after the development of this Preliminary Health Assessment will be addressed in any subsequent Health Assessment.

- 1a. Environmental Protection Agency. Hazard Ranking System Package, September 16, 1987.
- 2a. Ecology and Environment, Inc. Expanded Site Investigation Final Report, Vols. 1 and 2. December 16, 1987.

The following additional documents were used in developing this Preliminary Health Assessment.

- 1b. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Selected PCBs (Aroclor-1260, -1254, -1248, -1232, -1221, and -1016). In draft.

# Health Assessment for

Site: MEW  
ID #: MOD980965  
Break: 3.6  
Other: \_\_\_\_\_

MISSOURI ELECTRIC WORKS (MEW) PROPOSED NATIONAL PRIORITIES LIST SITE

CAPE GIRARDEAU, MISSOURI

CERCLIS NO. MOD980965982

NOV 9 1989

Agency for Toxic Substances and Disease Registry  
U.S. Public Health Service

MEW Site File  
Break3\_009417

## THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, ATSDR has conducted this preliminary health assessment on the data in the site summary form. Additional health assessments may be conducted for this site as more information becomes available to ATSDR.

## SUMMARY

The Missouri Electric Works (MEW) site has been proposed for listing on the National Priorities List (NPL) by the U.S. Environmental Protection Agency (EPA). The facility sells, services, and remanufactures electric motors, transformers, and transformer controls. It has been in its present location since 1953. Past disposal practices have resulted in polychlorinated biphenyl (PCB) contamination of soil and sediment.

Based on the available information, this site is considered to be of potential public health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Human Exposure Pathways Section below, human exposure to PCBs may be occurring and may have occurred in the past via ingestion of and dermal contact with on-site soils and sediments. Recommendations are presented to restrict public access and contact with on-site soils and sediments.

## BACKGROUND

### A. SITE DESCRIPTION AND HISTORY

The Missouri Electric Works (MEW) occupies approximately 6.4 acres in a light industrial/commercial area. It has been in its present location since 1953. The site consists of one building and outside storage areas. The MEW facility sells, services, and remanufactures electric motors, transformers, and transformer controls. In addition, it recycles transformer oil and copper wire. The transformer oil was filtered and reused, with about 90 percent being salvaged. The remaining waste oil was either sold to local residents for dust-control purposes, disposed of by a removal contractor, or simply allowed to leak or spill onto the ground around the facility. Some waste oil was reportedly burned on site. The total amount of waste oil generated has been estimated to be 28,000 gallons. In 1984, approximately 5,000 gallons of waste oil were removed from the site.

The site is on a higher elevation than most of the residences or commercial establishments nearby. Adjacent and to the north is a carpet distributor. To the south, adjacent to and on approximately the same level, is a single-family residence. Further south several private residences border Highway 61. These residences are roughly the same elevation as the MEW facility with lower ground and Highway 61 separating them from MEW. To the west, separated from the facility by Highway 61 and a drainage ditch, are light industries. Most of the site property is east of the MEW building, bordered by a ravine and a warehouse parking lot.



## B. SITE VISIT

ATSDR representatives visited the site on March 21, 1989. The site is not fenced, and access is unlimited. The topography is relatively flat, but the boundaries slope on the north, west, and east to adjacent property. A drainage ditch in front (west) of the property contains standing water at points downstream. This drainage channel empties into the Cape La Croix Creek about 2 miles downstream. The ravine at the back (east) of the property eventually empties into a drainage ditch that runs along Wilson Road. This ditch contains standing water at its lower elevations. The ravine was dry at the time of the site visit. A fenced area within the site boundary contains a garden. This area may have been used for vegetable gardening (corn, onions) within the last year. Reportedly, there is an orchard on site. One small sign, containing a contaminated soil warning, was seen in the back of the property, facing inward toward the facility. Several transformers and other electrical equipment are stored outside the building. In the back of the property, there are piles of old tires. There were no indications that public contact with the site is a common occurrence.

## C. COMMUNITY HEALTH CONCERNS

No community health concerns have been reported.

## DEMOGRAPHICS, LAND AND RESOURCE USE

The number of employees in the surrounding industries and residences is unknown. MEW employs 10 people. Within a 4-mile radius of the site are an estimated 37,250 people, based on the 1980 census.

As stated above, the land surrounding the site is used primarily for industrial and commercial purposes. In the lower elevation areas to the east and south, there may be some cropland. No surface water bodies on, or close to, the site are suitable for or provide consistent human contact. The Mississippi River, located approximately 2 miles from the site, is used for fishing, boating (recreational and commercial), and swimming. The Cape La Croix Creek receives runoff from the site through a series of drainage ditches. The Creek eventually flows into the Mississippi River approximately 2 miles to the west.

Three groundwater-bearing units are near the site. These are the overburden on-site, the Platin limestone, and the alluvium to the south of the site. The depth to groundwater is estimated to be 35 feet. According to geological studies referenced in the Hazard Ranking System Package, these three water-bearing units are connected hydraulically. MEW uses the Platin limestone bedrock groundwater via an on-site well for the plant's industrial and drinking water needs. A public water supply well, used during peak demand periods, is screened in the alluvial aquifer. It is 3.2 miles south of the site. Most of the water needs of the City of Cape Girardeau are provided for by the Mississippi River. Groundwater from the public well is blended with river water during peak demand periods.

## ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

### A. ON-SITE CONTAMINATION

The environmental contamination on-site consists of polychlorinated biphenyls (PCBs). The following Table 1 details the environmental media found to be contaminated and the range of concentrations found. All values are for Aroclor-1260, a common PCB isomer found in transformer fluids.

TABLE 1  
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MISSOURI ELECTRIC WORKS

<u>ENVIRONMENTAL MEDIA</u>	<u>NUMBER OF SAMPLES</u>	<u>CONCENTRATION RANGE</u>
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Groundwater (domestic well)	2	ND
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In addition to PCB sampling, three sediment samples from drainage channels from the areas reported to have been used for burning were collected and analyzed for dioxins. The results, expressed in 2,3,7,8-tetrachlorodibenzodioxin equivalents, showed less than 1 ppb.

### B. OFF-SITE CONTAMINATION

Off-site sediments in the drainage from the site, air samples in the downwind direction from the site, and surface wipe samples on buildings adjacent to the site have been collected. These data are presented in Table 2.

TABLE 2  
OFF-SITE POLYCHLORINATED BIPHENYLS  
MISSOURI ELECTRIC WORKS

<u>ENVIRONMENTAL MEDIA</u>	<u>NUMBER OF SAMPLES</u>	<u>CONCENTRATION RANGE</u>
Sediment	56	0.4 - 540 ppm
Air	6	ND - 0.04 ug/m <sup>3</sup> *
Surface deposition	8	0.9 - 2.2 ug/100 cm <sup>2</sup>

\*approximately 3 parts per trillion (ppt) based on Aroclor-1260

MEW Site File  
Break3\_009421

### C. QUALITY ASSURANCE AND QUALITY CONTROL

Samples were collected and analyzed according to EPA contract laboratory program guidelines. The data appear to be of good quality and satisfactory for the purpose of judging public health implications of the contaminants noted. However, we could not determine if the monitoring well and domestic well water samples were filtered before analysis. Filtering water samples before analysis may result in an underestimate of exposure; water from domestic wells usually is not filtered.

Some data provided for review (Table 6 of reference 2) were not used in this assessment. Sample locations could not be determined from the information provided.

### D. PHYSICAL AND OTHER HAZARDS

The outside storage areas on site which contain electrical equipment to be serviced could pose physical hazards. Since the site is not fenced, public access can be gained.

## PATHWAYS ANALYSES

### A. ENVIRONMENTAL PATHWAYS (FATE AND TRANSPORT)

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Leaching from soil by water is expected to be slight under most conditions. However, in the presence of organic solvents, significant leaching can occur. Ordinarily, however, movement of PCBs through the soil will occur indirectly by migration of soil particles to which PCBs have adsorbed.

PCBs in air exist predominantly in the vapor phase. With a vapor pressure of  $4.05 \times 10^{-5}$  mm Hg at 25 degrees C, saturation vapor concentrations of Aroclor-1260 should approach 0.05 ppm. Saturation situations will never occur under normal environmental conditions (typical ambient concentrations of PCBs range from  $10^{-9}$  to  $10^{-6}$  ppm). Most PCB vapor will tend to sorb onto aerosols.

The degree of chlorination also influences the metabolism and distribution of PCBs in animals. Fish are particularly important in the bioaccumulation process as it pertains to humans, since game fish consume benthic organisms or other bottom-feeding fish and humans are prone to consume those fish higher up the food chain. Plants are not known to either metabolize or concentrate PCBs. Vegetables grown in contaminated soil may be contaminated if not thoroughly washed.

Therefore, the environmental pathways of concern at this site are contaminated soil, sediment, and airborne particulate and bioaccumulation in the aquatic food chain.

#### B. HUMAN EXPOSURE PATHWAYS

Based on the environmental pathways identified above, the following human exposure pathways are of potential concern at this site: ingestion of contaminated soil and sediment; dermal contact with contaminated soil and sediment; ingestion of garden produce grown in contaminated soil and not thoroughly washed; ingestion of contaminated aquatic organisms; and inhalation of airborne particulates.

PCB absorption can occur from ingestion, dermal, and inhalation exposure. However, the ingestion route is judged to be the most significant. Quantitative evaluations of the relative contribution by each route are generally not available.

#### PUBLIC HEALTH IMPLICATIONS

Occasional skin irritations, usually acne-like lesions and rashes called chloracne, and liver effects are the only significant adverse health effects that have been observed in PCB-exposed workers. Workers are exposed to PCBs at levels that are much higher than those received by the general public. Adverse health effects have not been observed in people in the United States with nonoccupational exposure. Effects of PCBs in experimentally exposed animals include liver damage, skin irritations, death, low birth weights and other reproductive effects, and cancer. However, these experimental exposures generally occur at higher levels than those found in the human environment. The liver and cutaneous tissues are the primary target organs due to high lipid (fat) content; PCBs are lipid soluble.

Various human subpopulations are considered to be at higher risk: those persons who have occupational exposure, nursing infants if their mothers have fish as a large portion of their diet, embryos, fetuses, and neonates because of incompletely developed liver microsomal enzyme systems, persons with liver infections, and persons with certain abnormal liver syndromes. There are no studies in the literature of PCB toxicity, conducted at concentrations comparable to those found in the contaminated media identified at this site, from which to derive potential or expected health effects. Of course, consideration of cancer as the endpoint of public health concern usually means that no exposure is to be tolerated. PCB-caused liver cancer has been demonstrated in laboratory animals; the available epidemiological data do not indicate a consistent tumorigenic effect among people exposed to PCBs.

PCB contamination has been documented in on-site soils, groundwater, and sediments; and in off-site sediments. The main route of transport of PCBs through the environment to human receptor populations is by ingestion of contaminated soil particles, and, for those whose diets contain unusually large amounts of aquatic organisms, ingestion of contaminated aquatic organisms, normally fish.

PCBs normally do not partition into the aqueous phase but remain adsorbed on sediments. Therefore, groundwater and surface water are not expected to be important pathways. Although only on-site groundwater has been evaluated, only slight contamination of groundwater has been found, considering the substantial surface soil contamination documented. Groundwater from the Platten formation was not found to be contaminated. PCB contamination in treated water supplies is rare; only those persons consuming untreated (filtered) groundwater would be expected to have any exposure by this route. The MEW well on-site has been sampled on two occasions and found to be uncontaminated. The water source for the adjacent residence is thought to be municipal but this has not been confirmed.

Excessive PCB exposure by inhalation has not been reported except in occupational situations. Air samples collected to gauge the site-related contamination showed a maximum concentration of 3 parts per trillion (ppt). Values of PCBs (converted to Aroclor 1260) measured in urban environments have ranged up to 2 ppt. We do not consider 3 ppt to be of public health concern. The increase in air concentrations as a result of on-site surface activities such as soil removal, construction, and so forth, and cannot be commented upon in the absence of data. The fact that off-site migration has occurred via the airborne pathway is supported by the surface sampling data. There are no public health-related criteria with which to evaluate surface contamination. Routine human contact with the surfaces evaluated is not likely.

Sediments found in channels draining the site contain PCBs. It is not clear from the information available how far downstream in the channels sampling was conducted before a cutoff concentration of 5 ppm PCB was encountered. However, considering the geographic and demographic characteristics of the surrounding area, we think that the frequency of occasional public contact with contaminated sediments is probably small, and that the frequency of chronic contact is probably nonexistent. This infrequent contact by persons conducting business in the industries adjacent to this site is not expected to result in any adverse health effects.

The opportunity for sediments to migrate to Cape La Croix Creek and ultimately to the Mississippi River probably depends largely on the amount of rainfall and the amount of human activity that displaces the sediments in the drainage channels. We have no information about the propensity for flooding in this area and the opportunity for sediments to be spread beyond their present boundaries. We would not expect any site-related aquatic food chain contamination to exist. The Cape La Croix Creek is essentially unusable for any type of fishing.

Access to the site by persons other than MEW workers is unrestricted. Children may live in the residence adjacent to the site, although this has not been determined. Children are more likely than adults to ingest or otherwise come in contact with contaminated soils. The other residences farther from the site are sufficiently removed such that significant contact by these persons would be a remote possibility.

PCB exposure from ingestion of contaminated soil remaining on produce taken from the on-site garden may be of public health concern. We do not know if this garden is still in use. Judging from the size of the garden, it probably is used for private use only, and widespread public exposure would be unlikely. Crops whose produce comes in contact with the ground and is not peeled or washed thoroughly is of greatest concern. The U.S. Food and Drug Administration (FDA) recommends that food contain no more than 3 ppm PCBs.

In summary, contaminated surface soil on site represents the pathway of most concern at this site, primarily because of the potential for ingestion and dermal contact, and secondarily because edible produce may be grown in the soil. On-site sediments also provide a potential public health concern via dermal contact and ingestion. Groundwater and surface water per se are not expected to be contaminated sufficiently to be of concern. Sediments probably have not migrated off-site to a distance where significant contact by the public would occur. Airborne exposure, under the conditions measured, is not of public health concern. Surface deposition cannot be evaluated in terms of public health impact; one would expect surface deposition to increase over time but be diluted by rainwater or other washoff phenomena.

MEW Site File  
Break3\_009425

### CONCLUSIONS

Based upon information reviewed, ATSDR has concluded that this site is of potential public health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Human Exposure Pathways Section above, human exposure to PCBs may be occurring and may have occurred in the past via contact with contaminated soil.

Off-site sediments are contaminated, but the geographic location of the contamination relative to potentially exposed populations limits the exposure to only infrequent and limited occurrences.

Contaminated sediments could eventually reach the Mississippi River, where bioaccumulation by edible aquatic species could occur. In our judgement, this is a remote possibility.

Although off-site migration via the air route has occurred, air PCB levels are unremarkable. Currently, surface deposition concentrations cannot be evaluated for public health impact.

Consumption of produce grown in on-site soils may be of public health concern.

Further environmental characterization and sampling of the site and impacted off-site areas during the Remedial Investigation and Feasibility Study (RI/FS) should be designed to address the environmental and human exposure pathways discussed above. When additional information and data become available, e.g., the completed RI/FS, such material will form the basis for further assessment by ATSDR at a later date.

### RECOMMENDATIONS

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, the Missouri Electric Works site has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indication that human exposure to on-site/off-site contaminants may be currently occurring and may have occurred in the past, this site is not being considered for follow-up health studies at this time because no human exposure to contaminants of public health concern exists at this time. However, if data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR will reevaluate this site for any indicated follow-up.

MEW Site File  
Break3\_009426

The following recommendations are presented:

1. Restrict access to the site in order to prevent contact with contaminated surface soil and sediment.
2. Control surface migration of contaminated sediments to limit additional PCB burden in off-site drainageways.
3. Advise against consuming produce grown in on-site soils. Better still, eliminate gardening activities in on-site soils.
4. Ascertain the domestic water source for the adjacent residence.
5. Determine if any children live in the adjacent residence.

#### PREPARERS OF THE REPORT

Environmental Health Reviewer:	Clifford L. Moseley, CIH, CHWS Certified Industrial Hygienist Environmental Engineering Branch
Regional Representative:	David Parker Public Health Advisor ATSDR Region VII Regional Services
Typist:	Charlotta V. Gavin Clerk Typist Environmental Engineering Branch

#### REFERENCES

The following documents were provided to ATSDR for review. These documents form the basis of this Preliminary Health Assessment. Further information made available after the development of this Preliminary Health Assessment will be addressed in any subsequent Health Assessment.

- 1a. Environmental Protection Agency. Hazard Ranking System Package, September 16, 1987.
- 2a. Ecology and Environment, Inc. Expanded Site Investigation Final Report, Vols. 1 and 2. December 16, 1987.

The following additional documents were used in developing this Preliminary Health Assessment.

MEW Site File  
Break3\_009427



- 1b. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Selected PCBs (Aroclor-1260, -1254, -1248, -1232, -1221, and -1016). In draft.

# Health Assessment for

Site: MEW  
ID #: MOD980965982  
Break: 2/10  
Other:

MISSOURI ELECTRIC WORKS (MEW) PROPOSED NATIONAL PRIORITIES LIST SITE

CAPE GIRARDEAU, MISSOURI

CERCLIS NO. MOD980965982

NOV 9 1985

Agency for Toxic Substances and Disease Registry  
U.S. Public Health Service

MEW Site File  
Break3\_009429

## THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, ATSDR has conducted this preliminary health assessment on the data in the site summary form. Additional health assessments may be conducted for this site as more information becomes available to ATSDR.

## SUMMARY

The Missouri Electric Works (MEW) site has been proposed for listing on the National Priorities List (NPL) by the U.S. Environmental Protection Agency (EPA). The facility sells, services, and remanufactures electric motors, transformers, and transformer controls. It has been in its present location since 1953. Past disposal practices have resulted in polychlorinated biphenyl (PCB) contamination of soil and sediment.

Based on the available information, this site is considered to be of potential public health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Human Exposure Pathways Section below, human exposure to PCBs may be occurring and may have occurred in the past via ingestion of and dermal contact with on-site soils and sediments. Recommendations are presented to restrict public access and contact with on-site soils and sediments.

## BACKGROUND

### A. SITE DESCRIPTION AND HISTORY

The Missouri Electric Works (MEW) occupies approximately 6.4 acres in a light industrial/commercial area. It has been in its present location since 1953. The site consists of one building and outside storage areas. The MEW facility sells, services, and remanufactures electric motors, transformers, and transformer controls. In addition, it recycles transformer oil and copper wire. The transformer oil was filtered and reused, with about 90 percent being salvaged. The remaining waste oil was either sold to local residents for dust-control purposes, disposed of by a removal contractor, or simply allowed to leak or spill onto the ground around the facility. Some waste oil was reportedly burned on site. The total amount of waste oil generated has been estimated to be 28,000 gallons. In 1984, approximately 5,000 gallons of waste oil were removed from the site.

The site is on a higher elevation than most of the residences or commercial establishments nearby. Adjacent and to the north is a carpet distributor. To the south, adjacent to and on approximately the same level, is a single-family residence. Further south several private residences border Highway 61. These residences are roughly the same elevation as the MEW facility with lower ground and Highway 61 separating them from MEW. To the west, separated from the facility by Highway 61 and a drainage ditch, are light industries. Most of the site property is east of the MEW building, bordered by a ravine and a warehouse parking lot.

## B. SITE VISIT

ATSDR representatives visited the site on March 21, 1989. The site is not fenced, and access is unlimited. The topography is relatively flat, but the boundaries slope on the north, west, and east to adjacent property. A drainage ditch in front (west) of the property contains standing water at points downstream. This drainage channel empties into the Cape La Croix Creek about 2 miles downstream. The ravine at the back (east) of the property eventually empties into a drainage ditch that runs along Wilson Road. This ditch contains standing water at its lower elevations. The ravine was dry at the time of the site visit. A fenced area within the site boundary contains a garden. This area may have been used for vegetable gardening (corn, onions) within the last year. Reportedly, there is an orchard on site. One small sign, containing a contaminated soil warning, was seen in the back of the property, facing inward toward the facility. Several transformers and other electrical equipment are stored outside the building. In the back of the property, there are piles of old tires. There were no indications that public contact with the site is a common occurrence.

## C. COMMUNITY HEALTH CONCERNS

No community health concerns have been reported.

## DEMOGRAPHICS, LAND AND RESOURCE USE

The number of employees in the surrounding industries and residences is unknown. MEW employs 10 people. Within a 4-mile radius of the site are an estimated 37,250 people, based on the 1980 census.

As stated above, the land surrounding the site is used primarily for industrial and commercial purposes. In the lower elevation areas to the east and south, there may be some cropland. No surface water bodies on, or close to, the site are suitable for or provide consistent human contact. The Mississippi River, located approximately 2 miles from the site, is used for fishing, boating (recreational and commercial), and swimming. The Cape La Croix Creek receives runoff from the site through a series of drainage ditches. The Creek eventually flows into the Mississippi River approximately 2 miles to the west.

Three groundwater-bearing units are near the site. These are the overburden on-site, the Platin limestone, and the alluvium to the south of the site. The depth to groundwater is estimated to be 35 feet. According to geological studies referenced in the Hazard Ranking System Package, these three water-bearing units are connected hydraulically. MEW uses the Platin limestone bedrock groundwater via an on-site well for the plant's industrial and drinking water needs. A public water supply well, used during peak demand periods, is screened in the alluvial aquifer. It is 3.2 miles south of the site. Most of the water needs of the City of Cape Girardeau are provided for by the Mississippi River. Groundwater from the public well is blended with river water during peak demand periods.

## ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

### A. ON-SITE CONTAMINATION

The environmental contamination on-site consists of polychlorinated biphenyls (PCBs). The following Table 1 details the environmental media found to be contaminated and the range of concentrations found. All values are for Aroclor-1260, a common PCB isomer found in transformer fluids.

TABLE 1  
ON-SITE POLYCHLORINATED BIPHENYLS  
MISSOURI ELECTRIC WORKS

<u>ENVIRONMENTAL MEDIA</u>	<u>NUMBER OF SAMPLES</u>	<u>CONCENTRATION RANGE</u>
Surface soil	91	1 - 28,000 ppm
Subsurface soil (1-2')	12	ND - 27 ppm
(3-4')	12	ND - 43 ppm
(5-6')	1	ND
Groundwater (domestic well)	2	ND
(monitoring well)	4	ND - 0.004 ppm

In addition to PCB sampling, three sediment samples from drainage channels from the areas reported to have been used for burning were collected and analyzed for dioxins. The results, expressed in 2,3,7,8-tetrachlorodibenzodioxin equivalents, showed less than 1 ppb.

### B. OFF-SITE CONTAMINATION

Off-site sediments in the drainage from the site, air samples in the downwind direction from the site, and surface wipe samples on buildings adjacent to the site have been collected. These data are presented in Table 2.

TABLE 2  
OFF-SITE POLYCHLORINATED BIPHENYLS  
MISSOURI ELECTRIC WORKS

<u>ENVIRONMENTAL MEDIA</u>	<u>NUMBER OF SAMPLES</u>	<u>CONCENTRATION RANGE</u>
Sediment	56	0.4 - 540 ppm
Air	6	ND - 0.04 ug/m <sup>3</sup> *
Surface deposition	8	0.9 - 2.2 ug/100 cm <sup>2</sup>

\*approximately 3 parts per trillion (ppt) based on Aroclor-1260

MEW Site File  
Break3\_009433

### C. QUALITY ASSURANCE AND QUALITY CONTROL

Samples were collected and analyzed according to EPA contract laboratory program guidelines. The data appear to be of good quality and satisfactory for the purpose of judging public health implications of the contaminants noted. However, we could not determine if the monitoring well and domestic well water samples were filtered before analysis. Filtering water samples before analysis may result in an underestimate of exposure; water from domestic wells usually is not filtered.

Some data provided for review (Table 6 of reference 2) were not used in this assessment. Sample locations could not be determined from the information provided.

### D. PHYSICAL AND OTHER HAZARDS

The outside storage areas on site which contain electrical equipment to be serviced could pose physical hazards. Since the site is not fenced, public access can be gained.

## PATHWAYS ANALYSES

### A. ENVIRONMENTAL PATHWAYS (FATE AND TRANSPORT)

PCBs are man-made compounds that are persistent in the environment and that resist biodegradation, with the degree of persistence related to the percent chlorination. The most common trade name is Aroclor. Aroclor-1260, the PCB measured at this site, is very stable in the environment. Aroclor-1260 is 60 percent chlorinated.

PCBs are strongly adsorbed to sediments or other organic matter in water, with the degree of sorbency directly related to the percent chlorination. Experimental and monitoring data have shown that PCB concentrations are higher in sediment and suspended matter than in the associated water column. However, resolution into the water column from contaminated sediments has been shown to occur, and is suspected to be a major factor, along with volatilization from ground surfaces, in the cycling of PCBs in the environment. Solubility in water ranges from 0.0027 (Aroclor-1260) to 0.42 mg/L, with solubility increasing with lower percent chlorination. Henry's Law constants (estimates the potential for a chemical to be released from a water matrix) for PCBs range from  $5.2\text{E-}4$  to  $2\text{E-}3$  atmosphere-meter<sup>3</sup>/mole (25 degrees C), with Aroclor-1260 equal to  $4.6\text{E-}3$ .

Leaching from soil by water is expected to be slight under most conditions. However, in the presence of organic solvents, significant leaching can occur. Ordinarily, however, movement of PCBs through the soil will occur indirectly by migration of soil particles to which PCBs have adsorbed.

MEW Site File  
Break3\_009434

PCBs in air exist predominantly in the vapor phase. With a vapor pressure of  $4.05 \times 10^{-5}$  mm Hg at 25 degrees C, saturation vapor concentrations of Aroclor-1260 should approach 0.05 ppm. Saturation situations will never occur under normal environmental conditions (typical ambient concentrations of PCBs range from  $10^{-9}$  to  $10^{-6}$  ppm). Most PCB vapor will tend to sorb onto aerosols.

The degree of chlorination also influences the metabolism and distribution of PCBs in animals. Fish are particularly important in the bioaccumulation process as it pertains to humans, since game fish consume benthic organisms or other bottom-feeding fish and humans are prone to consume those fish higher up the food chain. Plants are not known to either metabolize or concentrate PCBs. Vegetables grown in contaminated soil may be contaminated if not thoroughly washed.

Therefore, the environmental pathways of concern at this site are contaminated soil, sediment, and airborne particulate and bioaccumulation in the aquatic food chain.

#### B. HUMAN EXPOSURE PATHWAYS

Based on the environmental pathways identified above, the following human exposure pathways are of potential concern at this site: ingestion of contaminated soil and sediment; dermal contact with contaminated soil and sediment; ingestion of garden produce grown in contaminated soil and not thoroughly washed; ingestion of contaminated aquatic organisms; and inhalation of airborne particulates.

PCB absorption can occur from ingestion, dermal, and inhalation exposure. However, the ingestion route is judged to be the most significant. Quantitative evaluations of the relative contribution by each route are generally not available.

#### PUBLIC HEALTH IMPLICATIONS

Occasional skin irritations, usually acne-like lesions and rashes called chloracne, and liver effects are the only significant adverse health effects that have been observed in PCB-exposed workers. Workers are exposed to PCBs at levels that are much higher than those received by the general public. Adverse health effects have not been observed in people in the United States with nonoccupational exposure. Effects of PCBs in experimentally exposed animals include liver damage, skin irritations, death, low birth weights and other reproductive effects, and cancer. However, these experimental exposures generally occur at higher levels than those found in the human environment. The liver and cutaneous tissues are the primary target organs due to high lipid (fat) content; PCBs are lipid soluble.

MEW Site File  
Break3\_009435



Various human subpopulations are considered to be at higher risk: those persons who have occupational exposure, nursing infants if their mothers have fish as a large portion of their diet, embryos, fetuses, and neonates because of incompletely developed liver microsomal enzyme systems, persons with liver infections, and persons with certain abnormal liver syndromes. There are no studies in the literature of PCB toxicity, conducted at concentrations comparable to those found in the contaminated media identified at this site, from which to derive potential or expected health effects. Of course, consideration of cancer as the endpoint of public health concern usually means that no exposure is to be tolerated. PCB-caused liver cancer has been demonstrated in laboratory animals; the available epidemiological data do not indicate a consistent tumorigenic effect among people exposed to PCBs.

PCB contamination has been documented in on-site soils, groundwater, and sediments; and in off-site sediments. The main route of transport of PCBs through the environment to human receptor populations is by ingestion of contaminated soil particles, and, for those whose diets contain unusually large amounts of aquatic organisms, ingestion of contaminated aquatic organisms, normally fish.

PCBs normally do not partition into the aqueous phase but remain adsorbed on sediments. Therefore, groundwater and surface water are not expected to be important pathways. Although only on-site groundwater has been evaluated, only slight contamination of groundwater has been found, considering the substantial surface soil contamination documented. Groundwater from the Platin formation was not found to be contaminated. PCB contamination in treated water supplies is rare; only those persons consuming untreated (filtered) groundwater would be expected to have any exposure by this route. The MEW well on-site has been sampled on two occasions and found to be uncontaminated. The water source for the adjacent residence is thought to be municipal but this has not been confirmed.

Excessive PCB exposure by inhalation has not been reported except in occupational situations. Air samples collected to gauge the site-related contamination showed a maximum concentration of 3 parts per trillion (ppt). Values of PCBs (converted to Aroclor 1260) measured in urban environments have ranged up to 2 ppt. We do not consider 3 ppt to be of public health concern. The increase in air concentrations as a result of on-site surface activities such as soil removal, construction, and so forth, and cannot be commented upon in the absence of data. The fact that off-site migration has occurred via the airborne pathway is supported by the surface sampling data. There are no public health-related criteria with which to evaluate surface contamination. Routine human contact with the surfaces evaluated is not likely.

MEW Site File  
Break3\_009436

Sediments found in channels draining the site contain PCBs. It is not clear from the information available how far downstream in the channels sampling was conducted before a cutoff concentration of 5 ppm PCB was encountered. However, considering the geographic and demographic characteristics of the surrounding area, we think that the frequency of occasional public contact with contaminated sediments is probably small, and that the frequency of chronic contact is probably nonexistent. This infrequent contact by persons conducting business in the industries adjacent to this site is not expected to result in any adverse health effects.

The opportunity for sediments to migrate to Cape La Croix Creek and ultimately to the Mississippi River probably depends largely on the amount of rainfall and the amount of human activity that displaces the sediments in the drainage channels. We have no information about the propensity for flooding in this area and the opportunity for sediments to be spread beyond their present boundaries. We would not expect any site-related aquatic food chain contamination to exist. The Cape La Croix Creek is essentially unusable for any type of fishing.

Access to the site by persons other than MEW workers is unrestricted. Children may live in the residence adjacent to the site, although this has not been determined. Children are more likely than adults to ingest or otherwise come in contact with contaminated soils. The other residences farther from the site are sufficiently removed such that significant contact by these persons would be a remote possibility.

PCB exposure from ingestion of contaminated soil remaining on produce taken from the on-site garden may be of public health concern. We do not know if this garden is still in use. Judging from the size of the garden, it probably is used for private use only, and widespread public exposure would be unlikely. Crops whose produce comes in contact with the ground and is not peeled or washed thoroughly is of greatest concern. The U.S. Food and Drug Administration (FDA) recommends that food contain no more than 3 ppm PCBs.

In summary, contaminated surface soil on site represents the pathway of most concern at this site, primarily because of the potential for ingestion and dermal contact, and secondarily because edible produce may be grown in the soil. On-site sediments also provide a potential public health concern via dermal contact and ingestion. Groundwater and surface water per se are not expected to be contaminated sufficiently to be of concern. Sediments probably have not migrated off-site to a distance where significant contact by the public would occur. Airborne exposure, under the conditions measured, is not of public health concern. Surface deposition cannot be evaluated in terms of public health impact; one would expect surface deposition to increase over time but be diluted by rainwater or other washoff phenomena.

MEW Site File  
Break3\_009437

### CONCLUSIONS

Based upon information reviewed, ATSDR has concluded that this site is of potential public health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Human Exposure Pathways Section above, human exposure to PCBs may be occurring and may have occurred in the past via contact with contaminated soil.

Off-site sediments are contaminated, but the geographic location of the contamination relative to potentially exposed populations limits the exposure to only infrequent and limited occurrences.

Contaminated sediments could eventually reach the Mississippi River, where bioaccumulation by edible aquatic species could occur. In our judgement, this is a remote possibility.

Although off-site migration via the air route has occurred, air PCB levels are unremarkable. Currently, surface deposition concentrations cannot be evaluated for public health impact.

Consumption of produce grown in on-site soils may be of public health concern.

Further environmental characterization and sampling of the site and impacted off-site areas during the Remedial Investigation and Feasibility Study (RI/FS) should be designed to address the environmental and human exposure pathways discussed above. When additional information and data become available, e.g., the completed RI/FS, such material will form the basis for further assessment by ATSDR at a later date.

### RECOMMENDATIONS

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, the Missouri Electric Works site has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indication that human exposure to on-site/off-site contaminants may be currently occurring and may have occurred in the past, this site is not being considered for follow-up health studies at this time because no human exposure to contaminants of public health concern exists at this time. However, if data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR will reevaluate this site for any indicated follow-up.

MEW Site File  
Break3\_009438

The following recommendations are presented:

1. Restrict access to the site in order to prevent contact with contaminated surface soil and sediment.
2. Control surface migration of contaminated sediments to limit additional PCB burden in off-site drainageways.
3. Advise against consuming produce grown in on-site soils. Better still, eliminate gardening activities in on-site soils.
4. Ascertain the domestic water source for the adjacent residence.
5. Determine if any children live in the adjacent residence.

#### PREPARERS OF THE REPORT

Environmental Health Reviewer:	Clifford L. Moseley, CIH, CHWS Certified Industrial Hygienist Environmental Engineering Branch
Regional Representative:	David Parker Public Health Advisor ATSDR Region VII Regional Services
Typist:	Charlotta V. Gavin Clerk Typist Environmental Engineering Branch

#### REFERENCES

The following documents were provided to ATSDR for review. These documents form the basis of this Preliminary Health Assessment. Further information made available after the development of this Preliminary Health Assessment will be addressed in any subsequent Health Assessment.

- 1a. Environmental Protection Agency. Hazard Ranking System Package, September 16, 1987.
- 2a. Ecology and Environment, Inc. Expanded Site Investigation Final Report, Vols. 1 and 2. December 16, 1987.

The following additional documents were used in developing this Preliminary Health Assessment.

MEW Site File  
Break3\_009439

- 1b. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Selected PCBs (Aroclor-1260, -1254, -1248, -1232, -1221, and -1016). In draft.